MULTIMEDIA TERMINAL FOR TELEPHONY ALLOWING MULTIPOINT

CONNECTIONS

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Background of the Invention:

Field of the Invention:

The invention relates to a multimedia terminal for telephony

allowing multipoint connections to a plurality of other

10 terminals.

Multipoint connections between a plurality of subscribers to a

communication network are known as conference circuits

controlled by a central conference circuit control provided in

15 the communication network. In this context it is known to

provide multipoint control units (MCU) in a communication

network. In the case of a multipoint connection that uses such

multipoint control units, terminals each have a point-to-point

connection to the multipoint control unit. This multipoint

20 control unit performs a multipoint function called multipoint

processing. This involves handling the datastreams of the

individual point-to-point connections, with other datastreams

coming from the individual terminals being mixed together and

the mixture which is produced in each case being transmitted

25 to the individual terminals. Such a procedure is for example

described in the ITU-T Standard H.323, Section 6.8.1, under the term "centralized conference".

Multipoint communication using a decentralized control, in
5 which a multipoint controller is provided only for processing multipoint signaling, is also known. Such a decentralized multipoint control can be implemented in a terminal or a multipoint control unit, for example. For this multipoint communication, each of the terminals involved transmits the
10 useful information to a multicast address, which is determined by the multipoint controller. The multipoint controller assigns a plurality of different multicast addresses and notifies each terminal of a multicast address for the information it has to transmit. Each terminal thus transmits
15 to a special multicast address and receives the information transmitted to the other multicast addresses assigned by the multipoint controller. To this end, all the terminals involved need to support multicast functions. As an alternative to using multicast, a so-called multi-unicast can also be
20 provided. For this multi-unicast method, the terminals use multiple point-to-point connections to transmit each of the datastreams to be transmitted to the other terminals involved in the multipoint connection.

25 Such a communication principle is, for example, described in the ITU-T Standard H.323, Section 6.8.2, under the term

"decentralized conference". In order to establish a multipoint communication using a decentralized controller or control based on this standard, on the basis of an existing call between a first subscriber A and a second subscriber B, the

5   following conditions must be fulfilled:

- At least one of the subscribers A and B must have a terminal with a multipoint controller, or an available gatekeeper must have a multipoint controller.

- All the terminals involved must support multicast functions

10   or multi-unicast functions.

A gatekeeper is a logic function for performing standard functions such as address resolution or bandwidth management. In this context, address resolution means that a calling

15   endpoint transmits to the gatekeeper a so-called alias address for an endpoint which is to be called, and receives from the gatekeeper the transport address, that is to say the Internet protocol address and the port number. The gatekeeper knows the volume of traffic with respect to real-time applications

20   within the network area for which it is responsible.

In addition, the subscriber A or B who is starting a consultation call with a further subscriber C while a call is being made between subscribers A and B must usually determine,

25   when this consultation call is actually being set up, whether the subscriber C to be consulted is to be included in the call

between subscribers A and B through the use of a multipoint
connection.

The different ways of setting up a multipoint connection using

5   a centralized control or a decentralized control, as described
above, do not allow a three-subscriber conference to be set up
flexibly on the basis of a two-subscriber call with a
consultation call.

10   Summary of the Invention:
It is accordingly an object of the invention to provide a
multimedia terminal which overcomes the above-mentioned
disadvantages of the heretofore-known terminals of this
general type and which allows a multipoint communication
15   between terminals to be set up flexibly.

With the foregoing and other objects in view there is
provided, in accordance with the invention, a multimedia
terminal for telephony based on ITU-T Standard H.323 for
20   setting up a multipoint connection to a plurality of
terminals, including a controller for processing signaling
information for a point-to-multipoint connection between the
multimedia terminal and a plurality of terminals; and a mixer,
connected to the controller, for mixing datastreams
25   originating at the multimedia terminal and at the plurality of

terminals and for providing datastream mixtures to the

plurality of terminals.

In accordance with another feature of the invention, the mixer

5 provides to each respective one of the plurality of terminals

a respective one of the datastream mixtures, which includes a

mixture of the datastreams originating at the multimedia

terminal and at a respective other one of the plurality of

terminals.

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With the objects of the invention in view there is also

provided, a multimedia terminal, including a function module

for setting up a multipoint connection to a first terminal and

to a second terminal based on ITU-T Standard H.323; a

15 controller, connected to the function module, for processing

signaling information for a point-to-multipoint connection

between the multimedia terminal, the first terminal, and the

second terminal; and a mixer, connected to the controller, for

mixing datastreams originating at the multimedia terminal, at

20 the first terminal, and at the second terminal and for

providing datastream mixtures to the first terminal and to the

second terminal.

In accordance with a further feature of the invention, the

25 mixer provides to the first terminal a respective one of the

datastream mixtures including a mixture of the datastreams

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originating at the multimedia terminal and at the second

terminal.

The invention achieves its object through the use of a novel

5   multimedia terminal for telephony based on the ITU-T Standard

H.323 for producing multipoint connections to a plurality of

other terminals. Such a terminal has a controller or, in more

general terms, a control for processing a signaling for point-

to-multipoint connections. It also contains a device for

10   mixing datastreams originating from terminals involved in the

multipoint connection and for providing datastream mixtures to

these terminals.

The controller or control for processing a signaling

15   information for point-to-multipoint connections allows point-

to-point connections to a plurality of other terminals to be

set up simultaneously. In addition, this control allows to

establish a point-to-multipoint connection configuration

which, with the help of the device for mixing datastreams

20   originating from the terminals involved in the multipoint

connection and for providing datastream mixtures to these

terminals, functions or operates as a multipoint-to-multipoint

connection for all the terminals involved.

25   Point-to-point connections can be set up using the regular

setup message based on ITU-T H.323, for example. If there are

already one or more point-to-point connections between a

terminal according to the invention and remote endpoints,

these connections can be put into a "hold" state before a new

point-to-point connection is established by using a "near end

5   hold" or "far end hold" message based on the ITU-T Draft

Recommendation H.450.4. The point-to-point connection to a

further terminal can then be made using a conventional setup

message based on ITU-T H.323, for example. When a conference

connection is established between all the terminals to which

10   there are point-to-point connections, the control of the

multimedia terminal according to the invention transmits a

facility message "ConferenceIndication.Invoke", for example,

requesting that an existing conference circuit be indicated.

15   In a particular embodiment of a terminal according to the

invention, this control or controller can also output control

channel messages of the "MultipointConference"-type or the

"CommunicationModeCommand"-type based on the ITU-T Standard

H.242 and in particular ITU-T H.323V2, Appendix I.

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The "CommunicationModeCommand" message can be output, for

example, in order to cause a remote endpoint to which there is

a point-to-point connection to close one transmission channel

and open another transmission channel. One reason for this

25   could be that an embodiment of a multimedia terminal according

to the invention is not able to mix the output signals from

different audio codecs. If one of the subscribers to an

intended conference circuit now has only one codec based on

ITU-T G.711 available, another subscriber can be requested to

close a transmission channel for data coded on the basis of

5   ITU-T G.723.1 and to change to another transmission channel

for data coded on the basis of ITU-T G.711.

Another reason for outputting a "CommunicationModeCommand"

message can be that the endpoints of a scheduled conference

10   circuit are capable of multicasting. In this case, the

"CommunicationModeCommand" message can contain the multicast

addresses to which the endpoints are to transmit their useful

information. In this application, the terminals at all the

endpoints would have to be capable of receiving and mixing the

15   datastreams before forwarding them to the appropriate

subscriber. The mixing device of the terminal according to the

invention would provide no datastream mixtures for the other

endpoints.

20   Also, if the terminal according to the invention wishes to

receive the datastreams from different endpoints via different

addresses, an existing connection can be changed using the

"CommunicationModeCommand" message, in order to establish a

conference circuit. In this case, too, the

25   "CommunicationModeCommand" message would be used to transmit

to the endpoint, to which there is a point-to-point

connection, the address to which information arriving from this endpoint is be transmitted.

In a further embodiment of a multimedia terminal according to
5 the invention, the control for point-to-multipoint signaling may be set up to use the "TerminalCapabilitySet = 0" message in order to close and to reopen logical channels based on the ITU-T Standard H.323V2, section 8.4.6 "Third Party Initiated Pause and Re-Routing". The "TerminalCapabilitySet" message is
10 usually used by a terminal to notify another terminal of what communication possibilities or communication opportunities it has available. In this context, the limits of these possibilities can be determined both, technically - due to hardware or software not being available - and, alternatively,
15 by defined authorizations. In order to initiate an existing useful data connection between two terminals, the control can transmit, for example to each of these terminals, a "TerminalCapabilitySet" message which implies that the respective other terminal has no communication possibilities
20 or communication opportunities available. The two terminals recognize these messages as a message transmitted by the respective other terminal. Since each of these terminals has been informed that the terminal, to which there are logical channels open, has no communication possibilities available,
25 these logical channels are switched off or disconnected.

The device for mixing datastreams originating from the

terminals involved in the multipoint connection and for

providing datastream mixtures to these terminals allows a

conference circuit to be established on the basis of a

5   plurality of point-to-point connections between a multimedia

terminal according to the invention and other terminals. In

this case, the other terminals require no particular

multipoint functionality or multitask functionality.

10   In a preferred embodiment of a multimedia terminal according

to the invention, the device for mixing provides each of the

terminals involved in the multipoint connection with a

datastream mixture of datastreams originating from the other

terminals involved in the multipoint connection. This ensures

15   that each of the terminals involved in a multipoint connection

receives the information from all the other terminals.

Other features which are considered as characteristic for the

invention are set forth in the appended claims.

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Although the invention is illustrated and described herein as

embodied in a multimedia terminal for telephony allowing

multipoint connections, it is nevertheless not intended to be

limited to the details shown, since various modifications and

25   structural changes may be made therein without departing from

the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention,
5 however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

10 Brief Description of the Drawings:
Fig. 1 is a block diagram of an expanded protocol layer model (protocol stack) of an exemplary embodiment of a multimedia terminal according to the invention; and

15 Fig. 2 is a message flowchart for setting up an ITU-T H.450 ad-hoc conference between three subscribers A, B, and C, with subscriber A using a multimedia terminal according to the invention.

20 Description of the Preferred Embodiments:
Referring now to the figures of the drawings in detail and first, particularly, to Fig. 1 thereof, there is shown an exemplary embodiment of a multimedia terminal MM-terminal according to the invention in a schematic block diagram in the
25 form of its expanded protocol layer model. As is usual in networks based on ITU-T H.323, the communication of the

terminal MM-terminal is based on the Internet protocol IP.

Taking the Internet protocol IP as a basis, the right-hand

side of Fig. 1 shows the protocol stack for the signaling,

which handles the call control.

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In this case, on the basis of the Internet protocol IP and the

signaling protocol TCP, a function module H.225.0 based on the

ITU-T Protocol H.225.0 is provided for a basic call control

signaling in H.323 networks. Exemplary messages for this

10   function module H.225.0 are SETUP or CONNECT.

Also, on the basis of the signaling protocol TCP, there is a

function module H.245 based on the ITU-T Control Protocol

H.245. This function module H.245 is used, among other things,

15   for exchanging "TerminalCapability" messages, that is to say

for submitting and receiving information regarding terminal

capabilities. This function module H.245 is also used for

defining task distributions such as master and slave functions

and for opening and closing logical channels used for useful

20   data transmissions. The function module H.245 is also

responsible for messages such as "MultipointConference",

"CommunicationModeCommand" or "EnableDecentralizedConference"

in a network based on ITU-T H.323. These messages are

necessary for the above-described methods for producing a

25   multipoint conference and are optionally usable in a

multimedia terminal according to the invention.

On top of the function module H.225.0, there are function

modules of additional facility controllers or features

controls, such as, according to the invention, the function

5   module "CONTROL CONFERENCE", which corresponds to a controller

or control for processing a signaling for point-to-multipoint

connections within the context of the invention. As further

function modules of additional facility controllers or feature

controls, Fig. 1 shows, by way of example, a function module

10   H.450 "HOLD" for producing or implementing a "HOLD" function

based on ITU-T H.450, and a further function module H.450

having further variants, indicated by dots, based on the ITU-T

Standard H.450.

15   Fig. 1 shows, on the left next to the signaling stack

described above, a useful data stack. This useful data stack

is also based on the Internet protocol IP, on which there is

UDP and on that, in turn, a real-time protocol RTP. In

addition to the real-time protocol RTP, the protocol UDP also

20   supports a real-time control protocol RTCP and that part

H.225.0 RAS of the control protocol according to ITU-T H.225.0

which concerns the areas of registration, administration, and

status.

25   On the basis of the real-time protocol RTP, there are codecs

or at least decoders for audio and video, which are denoted by

AUDIO, VIDEO in Fig. 1. Such audio codecs AUDIO are configured according to one of the ITU-T Standards G.711, G.723.1, or G.728, for example. Audio decoders AUDIO are for example also defined by ISO MPEG4 standards. ISO MPEG4 also defines

5   corresponding video decoders VIDEO. When decoders based on ISO MPEG4 are used, proprietary coders are possibly contained in a multimedia terminal MM-TERMINAL according to the invention.

The real-time control protocol RTCP and the codecs or decoders

10 for audio and video AUDIO, VIDEO are controlled by a media controller MEDIA CONTROL which, among other things, is responsible for the interaction of media input devices INPUT-DEVICE and media output devices OUTPUT-DEVICE provided in the multimedia terminal MM-TERMINAL. In this respect, media input

15 devices INPUT-DEVICE are, for example, cameras for video data, microphones for audio data or interfaces for data sources not included in the multimedia terminal MM-TERMINAL. In this context, output devices OUTPUT-DEVICE are, for example, a screen for video data, loudspeakers for audio data or

20 interfaces for output devices not included contained in the multimedia terminal MM-TERMINAL, such as printers or bulk memories.

The media controller MEDIA CONTROL also controls a device for

25 mixing datastreams originating from terminals involved in a multipoint connection and for providing datastream mixtures to

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these terminals. Such a mixing device, whose manner of

operation has been described above, is illustrated in Fig. 1

by the reference symbol MIXER.

5   The described stack for useful data handling RTP, RTCP,

H.225.0, AUDIO, VIDEO, and MEDIA CONTROL and the described

stack for a signaling handling H.245, H.225.0, CONTROL

CONFERENCE, H.450Hold, and H.450 are coupled to an application

programming interface API via a coordination function

10   COORDINATION FUNCTION. In this case, the coordination function

COORDINATION FUNCTION coordinates the interaction of the units

in this stack with the application programming interface API.

Examples of an application programming interface API are TAPI

15   or CAPI. The application programming interface API serves as

an interface between application programs or a user interface

and the coordination function COORDINATION FUNCTION.

In the initial state shown in Fig. 2, there is an active

20   connection between the terminals TeA and TeB of two

subscribers A and B. In this case, at least the terminal TeA

is a multimedia terminal MM-TERMINAL, as shown in Fig. 1, to

the extent that a function module CONTROL CONFERENCE is

provided as a controller for a processing signaling for point-

25   to-multipoint connections and a device MIXER for mixing

datastreams originating from terminals involved in a

multipoint connection.

The subscriber A sends a Setup message based on ITU-T H.323

5   from the terminal TeA to a terminal TeC of a subscriber C. In

this case, as shown in Fig. 2, a facility message or feature

message FAC(HoldNotification.inv) can optionally be

transmitted from the terminal TeA of subscriber A to the

terminal TeB of subscriber B in order to put the terminal TeB

10 into the "hold" state.

The terminal TeC uses a Connect message to acknowledge to the

terminal TeA the Setup message previously received from the

latter. A consultation connection in the form of logical

15 channels is then set up between the terminals TeA and TeC. If

the subscriber A associated with the terminal TeA wants a

conference circuit at this instant, the terminal TeA transmits

a facility message FAC(ConferenceIndication.inv) to each of

the terminals TeB and TeC in order to indicate that a

20 conference configuration is being called or selected. If,

before a Setup message was transmitted to the terminal TeC,

the terminal TeA had transmitted a message

FAC(HoldNotific.inv) to the terminal TeB, the terminal TeB can

be put back again into an active state from the "hold" state

25 by a message FAC (RetrieveNotific.inv) received from the

terminal TeA. The logical channels between the terminals TeA,

TeB, and TeC, which were already open before the conference

was started, continue to be used.